Using LCA as a screening tool for bioenergy options – case study of a meat processing plant

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Publication date:
2017

Document Version
Publisher's PDF, also known as Version of record

Using LCA as a screening tool for bioenergy options – case study of a meat processing plant

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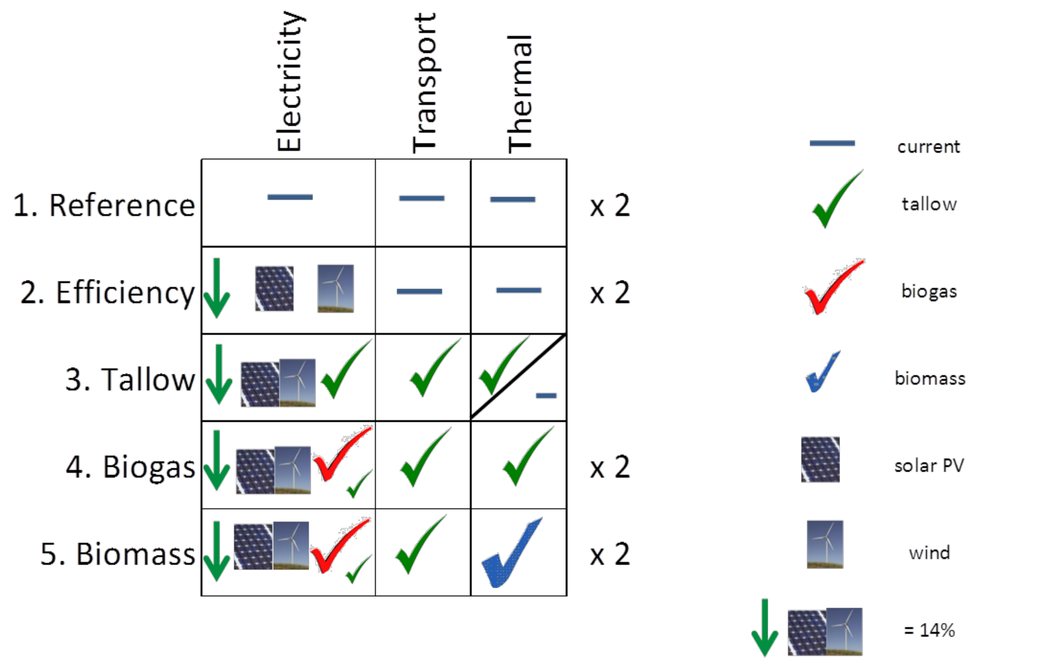
1. Current site details

- *Domestic kill & chill plant, no freezing, packaged HVAC units*
- *Regional location, not in a water constrained region*
- *Electricity from grid, no backup*
- *Thermal energy from coal, LPG, diesel*
- *Own transport fleet*
- *Onsite wastewater treatment pond system*

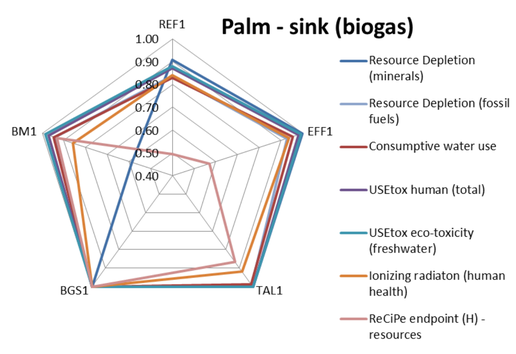
- **Redundancy in electricity supply a priority**
- **Limit to use of recycled, treated effluent due to Q fever Risk**

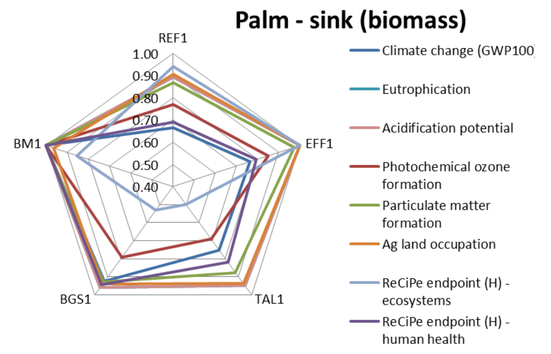
2. GATE-TO-GATE LCA

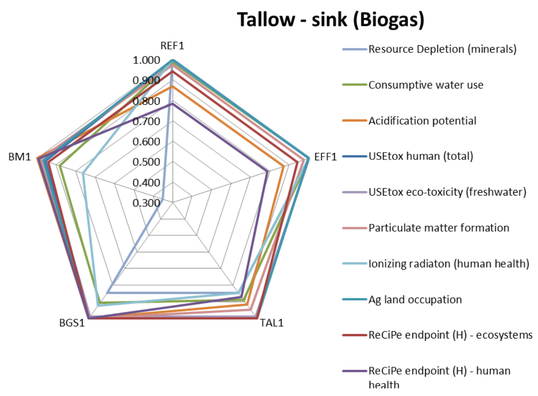
MODELLING SCENARIOS

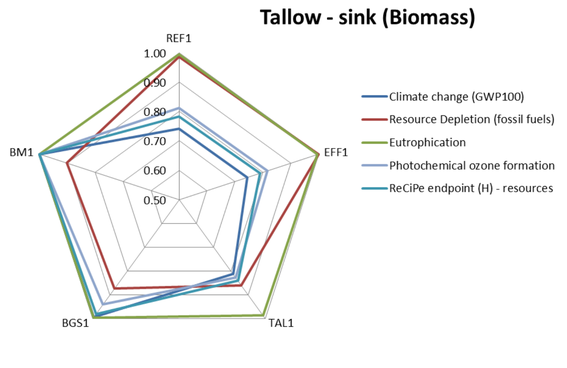


MODELLING RESULTS

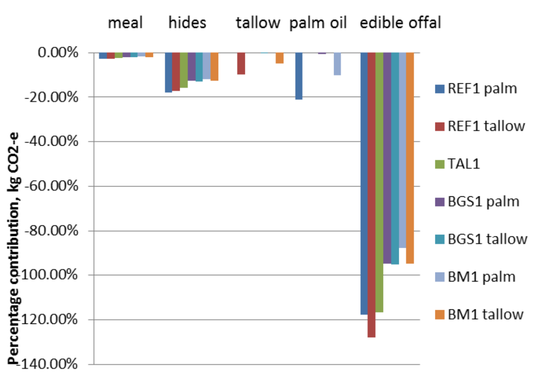






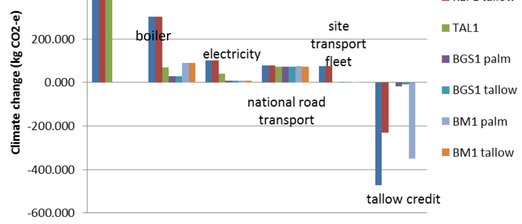


↑ Biomass option best when replacing palm oil
Biogas option best when replacing global tallow
Both biomass and biogas better than all tallow option



← Importance of byproduct optimisation

- Importance of reducing methane emission from anaerobic pond
- Tallow credit relative to saving in boiler fuel



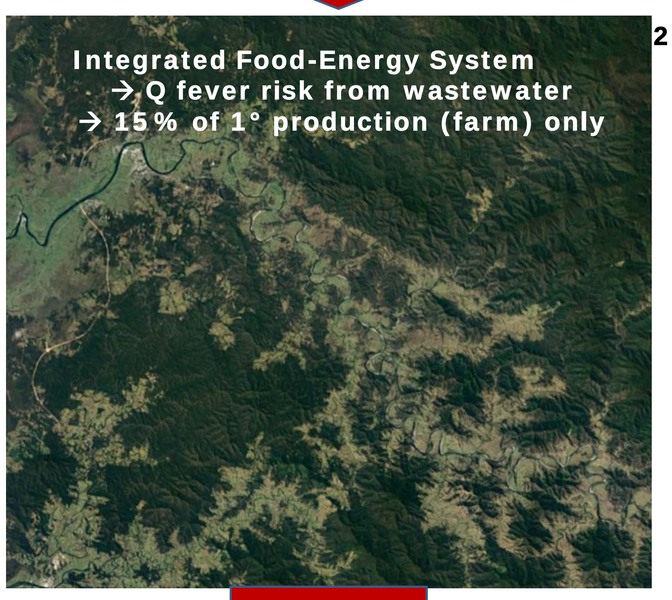
3. BIOMASS – LAND REQUIRED

Area of land required	For biomass production	For livestock production
per t HSCW (hectares)	0.03	20 (non-arable land)
Basis	• 10.4 GJ per tonne • 15 t per hectare per year	Derived from Wiedemann, S., McGahan et al, 2015

1.Linear easements

= road + rail + Powerlines

= 8% of catchment



2. Land use zones

- **Rural**
- **1° production**
- **Landscape**
- **Forestry**
- **Small Lots**
- **Residential**
- **Commercial**
- **Industrial**
- **Infrastructure**
- **Tourist**
- **Recreation (private / public)**
- **Park / reserve**
- **Waterways**
- **Environmental Conservation**
- **Environmental Management**
- **Environmental Living**

Area required to produce biomass per t HSCW per year is equivalent to…

0.16% of total area required to produce livestock feed for plant	1.05% of total area required to produce livestock if 15% is used for growing biomass	10.5% of total area required to produce livestock if 1 in 10 farms participates and allocates 15% of land is used for growing biomass	0.01% of a square kilometre or 0.000001% of a 100km radius from the plant

REFERENCES

Wiedemann, S., McGahan, E., Murphy, C., Yan, M.-J., Henry, B., Thoma, G., & Ledgard, S. (2015). Environmental impacts and resource use of Australian beef and lamb exported to the USA determined using life cycle assessment. Journal of Cleaner Production, 94, 67–75.

ACKNOWLEDGEMENTS

TAC would like to acknowledge the support of the lovely team at Macleay River Meats, particularly Kerri Riddington and Stafford and Dianne Everson, who provided data and unfailing enthusiasm and moral support for this work. No funding support was provided by the industry for this project.

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